Long-Term Determinants of Portuguese Public Expenditures

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Abstract

This work aims at identifying the determinants that explain the growth of Portuguese public expenditures since the end of II World War. For the Portuguese reality, it is one of the first attempts to discuss a large set of simultaneously tested determinants. For this purpose, the methodology started from a model that tries to identify public expenditures to a system of simultaneous macroeconomic forces and, for testing, it followed the steps associated to the cointegration analysis. Using the most convenient techniques, a restrictive set of four variables (Number of Unemployed People, Number of Public Employees, Rate of Openness and Current Transfers per capita) was found among the wider set suggested by the Literature. The variable associated to the dominant force is the Number of Unemployed, whose percentual increase promotes a raise of almost 0,30% of Portuguese real total expenditures.

Key-Words: Public Expenditures; Theories of Public Expenditures growth; Cointegration
JEL Classification: C22; C52; H50

1. Introduction

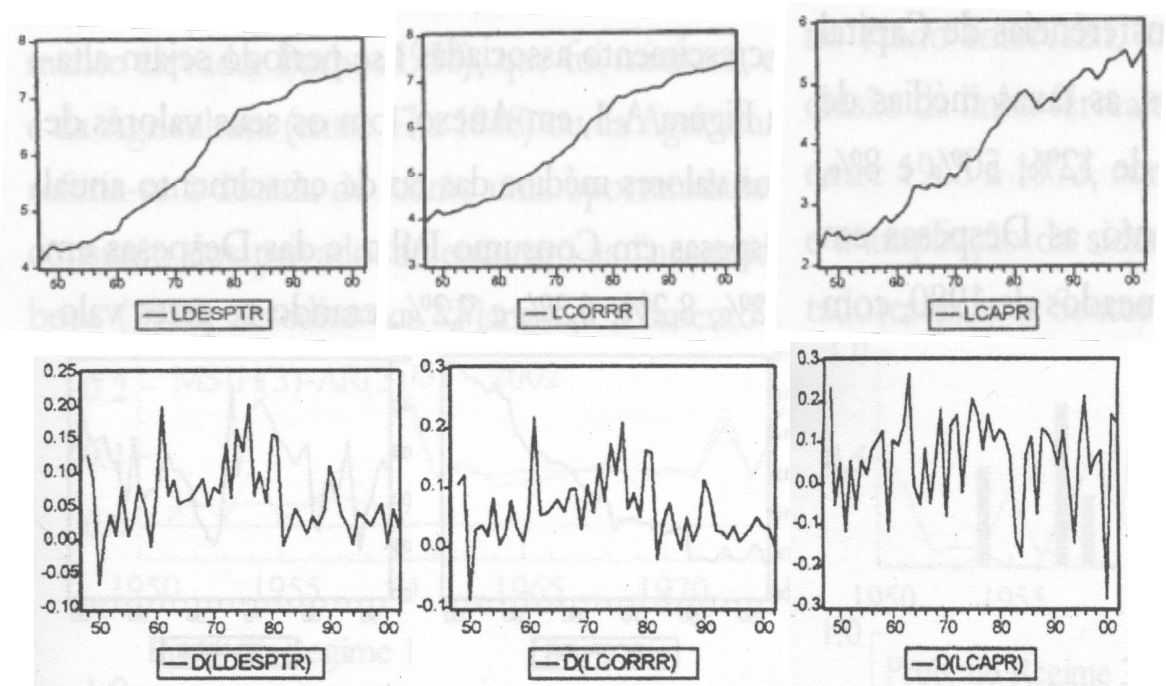
It is widely recognized that public expenditures have significantly increased worldwide after the II World War. In spite of this evidence, the reasons that can explain this movement are not so consensual. Some authors (see Bird, 1971; Buchanan and Wagner, 1977; or Becker, 1983) argue that the main factors are located in the demand of public goods or services while others defend that the focus should be put on the supply side (see Baumol, 1967; Wildavksy, 1964; or Niskanen, 1971). The first group mainly accuses the determinants of collective choice that induce significant social transformations, promoting an increasing demand for the public role. The second group uses that main assumption of opportunistic public rulers, who try to signal competence recurring to the management of public outlays.

For the Portuguese case, there is an abundant literature specifically focusing descriptive studies and normative perspectives. Under the aim of enunciating some of these works, we can point Carreira (1989), Silva and Neves (1992), Afonso (2000) or Bronchi (2003). Generally pointed, these studies discuss probable reasons for the increasing movement of Portuguese public expenditures, but they did not supply empirical data, synthesizing their discussions with idiosyncratic postulates, describing co-movements of the public series (for instances, the increasing trend of public expenditures, public revenues, social security outlays and the ageing people) or treating the expenditures as a unique aggregate and overpassing the particularities of the component series. For the Portuguese reality, this

work is one of the first attempts to discuss a large set of simultaneously tested determinants, respecting the individual movement of each public outlay.

The Portuguese Public Expenditures reveal a notorious growth until the beginnings of the 1980. Since this period, the evolution has not been characterized by so significant rates. Until 1980, the average growth rate of this macroeconomic aggregate was 9.2%. Since then, the average growth rate has rounded the value of 8.8%. As a proportion of real GNP, Portuguese real Public Expenditures grew from the 13% (of 1947) to the 42% (of nowadays). These values can be confirmed in Mourão (2006). The graphs of the series analyzed in this work can be observed in the Figure 1.1 (at the Annex)

Figure 1.1: Portuguese Real Aggregate, Current and Capital Public Expenditures (1947-2002, log scale)



Legend: LDESPTR, Aggregate Exp.; LCORR, Current Exp.; LCAPR, Capital Exp.; D(LDESPTR), First differences of LDESPTR; D(LCORRR), First differences of LCORRR; D(LCAPR), First differences of LCAPR.

Particularly, this research has the goal of identifying the determinants that have been influencing the movements perceived in the Portuguese public expenditures since 1947. According to Albi, González-Páramo and Zubiri (2000), we can reach biased results if we only consider the aggregate public expenditures as a single dependent variable. Because of the possibility of some of the determinants specifically influencing some of the expenditures, I disaggregated the total expenditures into their economic components (current and capital spending). As suggested by Stock and Watson (1993) or Oxley and McAleer (1999), I recurred to various estimation methods to get the aimed elasticities from a long-term public demand function.

Using the most convenient techniques, a restrictive set of four variables (Number of Unemployed People, Number of Public Employees, Rate of Openness and Current Transfers *per* capita) was found among the wider set suggested by the Literature. The variable associated to the dominant force is the Number of Unemployed, whose percentual increase promotes a raise of almost 0,30% of Portuguese real total expenditures.

These achievements demonstrate that the Portuguese Public Sector is particularly dependent of the size of bureaucracy and of the evolution in the international markets, while suppliers of Portuguese public orders. Additionally, these results also confirm that the role of redistributive agent can significantly explain the movements of the spending of the Portuguese Republic.

The structure of the paper is as follows: in the second section, I suggest the review of the most relevant literature; in the third, I introduce the structural demand function and the used data; in the

fourth, I briefly describe the methodology and the obtained major results. Finally, in the fifth, I conclude.

2. Theories on the growth of Public Expenditures: a synthesis

Although the alternative classifications from Holsey and Borcherding (1997) or Mastromatteo (2003), the following theories are considered according to the most observed typology, as stated by authors like Albi, González-Páramo and Zubiri (2000), Legrenzi (2001) or Kheng (2001). These authors group the theories on the growth of public expenditures into two categories: theories that mainly recognize the pressure on Demand side (with the assumption of the neutrality of public agents) and theories that deny the neutrality of decision-makers defending the relevance of the Supply side action.

The theories, that immediately follow, belong to the group of the Demand-side Theories.

In the last quarter of the nineteenth century, Adolph Wagner (1883) enunciated two purposes of explanation on the growth of public expenditures. The first of Wagner's explanations identified the social transformation between a society based on primary activities (as agriculture or fishery) and a society with the rising of the industrial sector. The second "law" of Wagner suggested that public goods were characterized by higher income elasticities (as, in a microeconomics context, the luxury goods): so, with rising national product and national income, public expenditures tended to grow. Thus, the common exogenous variable to explain the growth of public expenditures is national product. More recently, some authors argue that other social transformations must be considered and they include the proportion of residents older than 65 years as alternative explicative variable.

Peacock and Wiseman (1961) identified "Displacement Effects" as a reason for the shift of the demand of public goods and services. Facing obligations assumed during special periods, like wars or social convulsions, governments have difficulties when they try to re-establish the structures of public expenditures, which were verified before these unusual moments. Therefore, after these moments, there is a tendency to increase the amount of public outlays.

Other authors, like Downs (1957), Romer and Rosenthal (1978) or Meltzer and Richard (1981) appealed to the redistribution processes as a possible cause of public growth expenditures. According to the Theorem of the Median Voter of Downs (1957), the politicians will search to satisfy the preferences of the median voter (observing an ordinary scale of some measurable variable, like personal income). Therefore, democratic elected governments will try to please this representative voter, enlarging her endowments, especially through current transfers. Consequently, a very suggestive explicative variable of the growth of public outlays should be the identified with the movement of real Current Transfers *per capita.*

Buchanan and Wagner (1977) or Romer (1999) argue that imperfect knowledge promote the growth of budgetary deficits (a popular example are the Puviani-types of introducing "fiscal illusion", usually computed recurring to ratios built upon the proportion between the direct, more visible, and the indirect, less visible, taxes). In the context of understanding what stresses public expenditures attending on the demand side, Tabellini and Alesina (1990) wrote about the public strategic debt choice, Rogoff (1990) pointed fiscal cycles as possible reasons and Alesina and Drazen (1991) studied the absence of an agreement among political forces.

Buchanan and Tullock (1962), Cameron (1978) and Becker (1983) also appreciated the role of lobbying groups as motors of the growth of public expenditures. Specifically, these lobbying groups have preferences for certain kind of politics and they try to delegate these preferences into the decision-makers. Cameron (1978), for instances, found that the Openness Rate of a country has a positive correlation with the public expenditures, which could be easily understandable to the Portuguese economy, as a small open one.

However, there remains a set of authors who argue that the strongest focus on the public growth expenditures should be put on Supply-Side. A synthesis of their suggestions is the following.

Baumol (1967) and Beck (1981) identify the relative prices (between private and public deflators) and the inelastic public demand as the main cause of the evolution of the public budgetary

outlays. Because of these assumptions, public expenditures should be studied after being deflated, i.e., as real aggregates.

Frey and Schneider (1981) and Rogoff and Sibert (1988) can be pointed as the seminal authors who wrote about the temporal proximity between electoral moments as responsible determinants for public expenditures cyclical peaks. The set of tests on this particular hypothesis usually recurs to time series procedures, namely the estimation of error-correction models. However, as Alesina and Perotti (1995) notice, this hypothesis is strategically relevant to study short-term movements and not so much to analyse long-term relations, here aimed.

Niskanen (1971) and Romer and Rosenthal (1978) study this problem according to an Adverse Selection perspective: because of the absence of precise knowledge of budget consequences, decision-makers, often, make the most expensive choice. This choice is especially interesting to bureaucrat groups. Consequently, a larger number of public employees promote a double effect on the public expenditures aggregate: it carries a natural stress on the public wages value but, additionally, it will be permanently increasing because this strategy is a strong-dominant one to the bureaucrat player in most of the models.

Bush and Denzau (1977), Frey and Pommerehne (1984), Cameron (1978) and Castles (1982) also observe the bureaucratic preferences, but now bureaucrats are studied as representative voters. This assumption is based on the observation that the direct and the indirect number of voters depending on the public employment is considerable high (on average, twenty percent in OECD, also considering other possible voters in the familiar nucleus of a bureaucrat). Therefore, political measures that reduce the acquired rights of public employees are hardly accepted by the opinion polls and, conversely, political measures that increment the size of public agencies are well accepted by the voters.

Castles (1982) developed other explanation - he finds ideological differences (of "right" or "left" parties) as contributors to the observed differences in outlays during legislative governments. According to him, "left" parties (like socialist or communist ones) are more willing to spend. However, studies of Esping-Andersen (1990) or of Moon (2001) identify considerable methodological problem on these works ("what is a left party?") and verify that the results are not consensual.

Brennan and Buchanan (1977) and Oates (1985) advise to the heterogeneous bias because of decentralized decisions (sometimes, there is an increment of public expenditures, sometimes, a reduction is observed). Thus, the proportion between the local and the total public revenues must also be studied as a potential contributor to the increasing of public spending.

Wildavsky (1964) recognizes that institutional causes (for example, what is behind a budgetary decision, what are the motivations of public agents, what are their typical behaviour) may influence the rhythms of public expenditures growth. Therefore, if public employees are used to have increasing real wages year after year, it becomes strictly hard not to respect this "rule" and reducing public expenditures when necessary.

3. The Model and Data

The goal of this work is to identify the determinants that can be recognized as responsible for the growth of Portuguese public expenditures since the end of the II World War and to estimate their elasticities. Consequently, we have two main groups of public expenditures, recurring to the economic classification: the current (expenditures related to the daily work of the public sector) and the capital ones (outlays associated to the public investment). The arithmetic sum of them will result in the total public expenditures. According to Beck (1981) and to Tridimas (1992), these three variables have to be considered in real terms, due to the effect of the evolution of the prices related to public consumption that magnifies the nominal values. For this purpose, I recurred to weight the different deflators[1] of the

[1] According to Beck (1981), since the public expenditures are the result of the acquisition of mix goods (that have simultaneous characteristics of strictly public and strictly private goods), they must be deflated by a weighted product of the Deflator of the Public Consumption with the Deflator of the Private Consumption. Neves (1996), Pinheiro (1997) and the Ministry of the Economy supply these Deflators for Portugal, respectively, between 1947 and 1955, between 1956 and 1995, and between 1996 and 2002.

public series *à la Paasche*, following Beck (1981), to generate the final deflator, which deflated the aggregate, the current and the capital expenditures. The logarithmizations of the real values of the outlays are identified by LDESPTR (real total public expenditures), LCORRR (real current expenditures) and LCAPR (real capital expenditures).

According to the previous theories, we have to recognize that total expenditures are like the resulting force (F_r) – the demand quantities of a good - of a system of n simultaneous forces (F_i) – the determinants of this demand, the macroeconomic outlays pointed as potentially influential on the target-aggregate.

Following the typical vectorial annotation, then we can write

$$F_r = \sum_{i=1}^{n} F_i \tag{3.1}$$

However, different evolutions of different determinants motive changes in the resulting demanded quantities:

$$F_i = m_i * \overset{\rho}{a}_i \tag{3.2}$$

where m_i is the mass/magnitude of the determinant and $\overset{\rho}{a}_i$ its acceleration/change.

Thus, when trying to test the significance of all of the forces acting on a system (deriving the relevant forces on it) we must start from the relation

$$F_r = \alpha + \sum_{i=1}^{n} m_i * \overset{\rho}{a}_i + u_i \tag{3.3}$$

Concretising in our work, we are able to write

$$LEXP_t = \alpha + \sum_{j=1}^{k} \delta_j * z_{j_t} + u_t \tag{3.4}$$

The equation (3.4) also follows Kirchgassner and Pommerehne (1997) who, alternatively, had derived it after a discussion of a median voter model. $LEXP_t$ is identified with the set of the variables *LDESPTR, LCORRR* and *LCAPR* and z_t with the set of k long-term determinants.

I used the following logaritmized variables (suggested by the previous review of Literature, in the Section 2) to discuss the determinants that can explain the movement of the Portuguese public expenditures: Number of Unemployed[2] (*LDESEMP*), real Gross Domestic Product[3] (*LPIBR*), total Public Revenues[4] (*LREC*), Number of Public Employees[5] (*LFUN*), rate of openness[6] (*LTXAB*), proportion between the direct and the indirect taxes[7] (*LDIR*), proportion between the local and the total public revenues[8] (*LLOC*), proportion of Portuguese residents older than 65 years[9] (*LIDOS*), municipal electoral years[10] (dummy, *AUTARQ*), legislative electoral years[11] (dummy, *AREP*), years characterized by a parliamentary majority of "left" parties[12] (dummy, *COR*) and real Current Transfers per capita[13] (*LTRACORP*). Although the justification behind the choice for each one of these explicative variables is rather clear following the Section 2, a full explanation and a full statistical description is found in Mourão (2004)

All of these annual variables were observed between 1947 and 2002. Their main sources were Pinheiro (1997), the annual governmental report of national Public Finances ("Conta Geral do Estado",

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[2] According to (AT), Frey and Schneider (1978).
[3] AT Wagner (1883) or Bird (1971).
[4] AT Wildavsky (1964).
[5] AT Buchanan and Tullock (1962) or Cameron (1978).
[6] AT Cameron (1978).
[7] AT Buchanan and Wagner (1977).
[8] AT Brennan and Buchanan (1977).
[9] AT Wagner (1883) or Bird (1971).
[10] AT Frey and Schneider (1978).
[11] AT Frey and Schneider (1978).
[12] AT Cameron (1978) or Castles (1982).
[13] AT Downs (1957) or Meltzer and Richard (1981).

CGE), from the "Direcção Geral do Orçamento", and the National Institute of Statistics ("Instituto Nacional de Estatísticas"). The Table 3.2 particularizes the sources.

Table 3.2: Explanatory variables (determinants) and their sources

LDESEMP	1947 a 1995: Pinheiro (1997) 1996 a 2002: GEE
LPIB-LDPIB	1947 a 1953: Andrade (2000) 1954 a 1995: Pinheiro (1997) 1996 a 2002: GEE
LREC	1947 a 1995: Pinheiro (1997) 1996 a 2002: CGE
LFUN	1947 a 1989: Neves (1994) 1990 a 2002: IEFP
LTXAB	1947 a 1995: Pinheiro (1997) 1996 a 2002: GEE
LDIR	1947 a 1995: Pinheiro (1997) 1996 a 2002: CGE
LLOC	1947 a 1995: Pinheiro (1997) 1996 a 2002: OE
LIDOS	1947 a 2002: INE
AUTARQ	1947 a 2002: CNE
AREP	1947 a 2002: CNE
COR	1947 a 2002: CNE
LTRACORP	1947 a 1995: Pinheiro (1997) 1996 a 2002: CGE
	1947 a 2002: INE

Note: LDPIB: (log) Deflator of the Gross National Product; Sources of LDPIB: between 1947 and 1955, Valério *et al*. (1989), between 1956 and 1995, Pinheiro (1997), and between 1996 and 2002, the Ministry of the Economy (GEE department). Confirm the full sources at the section "References".

4. Methodology and Results

To study the long-term relation among variables, econometricians have been purposing the analysis on the possibility of cointegration regressions, since the seminal works of Sargan (1964), Davidson, Hendry, Srba and Yeo (1978) or Engle and Granger (1987). Some important synthesis on the cointegration theme can be found in Haldrup (1998) or Oxley and McAleer (1999).

In a preliminary task, it is needed to characterize the integration level of each variable. For this purpose, I firstly used the popular Augmented Dickey-Fuller[14] (ADF) test. For discussing the preferred number of lags in each regression of test, it was used the Schwarz Information Criteria.

The results suggest that the series *LREC* and *LIDOS* are I(2) while all the others are I(1).

According to Elliott, Rothenberg and Stock (1996), the Augmented Dickey-Fuller test can reveal serious problems if there is a short sample of observations. In order to overpass this limitation, I followed their purpose to test the presence of unit-roots in all the variables. The results were convergent to those achieved with the ADF. I also found the previous suggestion using the Leybourne and McCabe (1994) test: all the series are I(1), except *LREC* and *LIDOS*.

The Table 4.1 returns the statistical values of the three analyzed series (LDESPTR, LCORRR and LCAPR), according to the cited tests.

[14] AT Dickey and Fuller (1979) and MacKinnon (1996).

Table 4.1: Statistical values from the unit roots tests of the studied stochastic series

y_t	$\Delta^d y_t$	DF-GLS	ADF		Leybourne and McCabe (1994)	
			Inter	Inter/Tend	Inter	Inter/Tend
LCORR-LDDESP	d=0	-0,873(1)	-0,773(1)	-0,252(3)	3,748(1)***	0,668(1)***
	d=1	-4,108(3)***	-4,073(1)***	-4,123(1)***	0,198(3)	0,101(3)
	d=2	-9,180(1)***	-9,249(2)***	-10,194(1)***	0,078(1)	0,070(1)
LCAP-LDDESP	d=0	-0,214(1)	-0,100(1)	0,538(1)	4,101(1)***	0,726(1)***
	d=1	-5,635(3)***	-5,632(1)***	-5,951(1)***	0,114(3)	0,106(3)
	d=2	-9,333(6)***	-9,405(1)***	-10,377(1)***	0,087(6)	0,083(6)
LDESEMP	d=0	-1,673(3)	-1,589(2)	-1,209(2)	3,312(3)***	0,597(3)***
	d=1	-5,209(1)***	-5,197(1)***	-5,441(1)***	0,138(1)	0,128(1)*
	d=2	-7,440(3)***	-7,473(3)***	-8,111(3)***	0,016(3)	0,085(3)
LPIB-LDPIB	d=0	-1,619(1)	-1,534(3)	-1,144(3)	3,341(3)***	0,602(1)***
	d=1	-4,362(2)***	-4,333(1)***	-4,428(1)***	0,184(2)	0,040(2)
	d=2	-8,802(2)***	-8,863(1)***	-9,741(1)***	0,058(2)	0,036(2)
LREC	d=0	-0,054(3)	0,063(3)	0,729(3)	4,196(3)***	0,740(3)***
	d=1	-1,956(2)	-1,878(2)	-1,548(2)	3,157(2)***	0,572(2)***
	d=2	-9,404(2)***	-9,478(2)***	-10,463(2)***	0,090(2)	0,089(2)
LFUN	d=0	-0,740(3)	-0,637(3)	-0,092(3)	3,821(3)***	0,680(3)***
	d=1	-4,460(3)***	-4,433(3)***	-4,545(3)***	0,079(3)	0,003(3)
	d=2	-6,213(1)***	-6,221(1)***	-6,642(1)***	0,008(1)	0,002(1)
LTXAB	d=0	-0,999(3)	-0,901(2)	-0,402(2)	3,679(3)***	0,657(3)***
	d=1	-7,080(1)***	-7,106(1)	-7,680(1)***	0,360(1)*	0,117(1)
	d=2	-10,321(2)***	-10,413(1)***	-11,559(1)***	0,149(2)	0,017(2)
LDIR	d=0	-2,466(3)	-2,398(3)	-2,158(2)	2,879(3)***	0,526(3)***
	d=1	-7,303(2)***	-7,334(2)***	-7,948(2)***	0,238(2)	0,096(2)
	d=2	-9,292(2)***	-9,363(2)***	-10,328(2)***	0,084(2)	0,080(2)
LLOC	d=0	0,877(3)	1,014(3)	1,844(3)	4,704(2)***	0,823(3)***
	d=1	-4,139(2)***	-4,105(1)***	-4,160(3)***	0,197(2)	0,037(2)
	d=2	-7,932(2)***	-7,975(1)***	-8,699(1)***	0,105(2)	0,004(2)
LIDOS	d=0	-0,353(2)	-0,242(1)	0,371(1)	4,032(2)***	0,714(2)***
	d=1	-2,440(4)	-2,371(1)	-2,126(1)	2,893(4)***	0,529(4)***
	d=2	-7,235(2)***	-7,264(2)***	-7,865(2)***	0,275(2)	0,103(2)
LTRACORP	d=0	-0,487(2)	-0,379(2)	0,210(2)	3,959(2)***	0,702(2)***
	d=1	-4,889(1)***	-4,871(1)***	-5,059(1)***	0,156(1)	0,031(1)
	d=2	-9,370(1)***	-9,443(1)***	-10,421(1)***	0,089(1)	0,008(1)

Legend: LCORR-LDDESP = LCORRR; LCAP-LDDESP = LCAPR; LPIB-LDPIB = LPIBR
Notes: Significance levels: 10% (*), 5% (**) and 1% (***).
In the second column, d=x identifies the x-th difference of the series.
Between parentheses, the preferred number of lags according to the Schwartz Criteria, in the ADF tests (Inter – with Interception, Inter/Tend – with Interception and Trend), or according to Ng and Perron (2001) in the DF-GLS and Leybourne-McCabe (1994) tests.

For confirming the existence of double unit-roots, I used the Dickey-Pantula (1987) suggestion. This test also recognized the earlier proposals.

Table 4.2: Statistical values from the Dickey-Pantula test of the most probable I(2) series analyzed

y_t	$\hat{\theta}_2 / \hat{\sigma}_{\theta_2}$	$\hat{\theta}_3 / \hat{\sigma}_{\theta_3}$
LREC	-0,934	-10,857***
LIDOS	-1,313	-8,333***

Note: Significance level: 1% (***).

After these proceedings, the regressions were initially estimated by *Static Ordinary Least* Squares. As stated by Krolzig and Hendry (2001), some of the variables may not be characterized by significant coefficients. Consequently, a second estimation must be computed, now omitting the non-significant variables[15].

[15] In this step, the non-significant variables were LREC, LIDOS, AUTARQ, AREP, and COR, replicating the results of Imbeau and Chenard (2002).

Since only rested I(1) variables in this phase, the null hypothesis of no-cointegration was then evaluated using Engle-Granger-type tests with MacKinnon (1996) tables. Observing those results (see Table 4.3), we can suspect that there are long-term relations among:

a) the (log of the) real Total Public Expenditures and the (logs of the) Number of Unemployed, the real Gross Domestic Product, the Number of Public Employees, the rate of Openness, the percentual relation of the direct taxes to the indirect ones, the proportion of local public revenues and the real Current Transfers *per capita*;
b) the (log of the) real Current Expenditures and the (logs of the) Number of Unemployed, the real Gross Domestic Product, the Number of Public Employees, the percentual relation of the direct taxes to the indirect ones, the proportion of local public revenues and the real Current Transfers *per capita*;
c) the (log of the) real Capital Expenditures and the (logs of the) percentual relation of the direct taxes to the indirect ones and the real Current Transfers *per capita*.

Table 4.3: Estimations from the long-term regressions, SOLS

		Regressands	
Regressors	**LDESPTR**	**LCORRR**	**LCAPR**
LDESEMP	0,113***	0,121***	NS
	(0,030)	(0,025)	
LPIBR	0,910***	0,923***	NS
	(0,062)	(0,051)	
LFUN	0,298***	0,501***	NS
	(0,130)	(0,120)	
LTXAB	0,202**	NS	NS
	(0,099)		
LDIR	0,190***	0,194***	0,356***
	(0,068)	(0,053)	(0,117)
LLOC	-0,142**	-0,177***	NS
	(0,062)	(0,046)	
LTRACORP	0,198**	0,197***	0,707***
	(0,074)	(0,028)	(0,014)
R2	**0,999**	**0,999**	**0,990**
DW	**1,288**	**1,493**	**0,847**
ADF	**-5,107**	**-5,603*** **	**-3,732***

Notes: Significance levels: 10% (*), 5% (**) and 1% (***) – *In the cells concerning the estimation of the coefficients, the null hypothesis is identified with the non-significance of the results while the null hypothesis related to the values in the last line (ADF statistic on the residual series) is identified with the non-cointegration among the regressands and the regressors according to critical values specified in MacKinnon (1996). Between parentheses, below the estimated coefficients, the standard errors are exhibited. "NS" signifies that the estimated coefficient was not significant in previous estimations and "NA" signifies that the hypothesis of the homogeneity of the regressor was considered in the estimation.*

After this step, it was observed that the coefficient associated to the (logs of the) real Gross Domestic Product (GDP) had a value around "1", in the regressions that had the logaritmized real total expenditures or the real current expenditures as dependent variables. Then, according to these results, we can accept the hypothesis of the homogeneity of the Product, what promotes new estimations using the previous variables (LDESPTR and LCORRR) as ratios of the real GDP. Briefly commenting the other coefficients, we can confirm the correction of the returned signs according to the theory (negative sign characterizing LLOC and positive sign characterizing the others regressors).

The Table 4.4 expresses the results from the set of estimations using the hypothesis of the homogeneity of the Product with LDESPTR and LCORRR as regressands.

Table 4.4: SOLS *estimation*

	Regressands		
Regressors	**LDESPTR-LPIBR**	**LCORRR-LPIBR**	**LCAPR**
LDESEMP	0,140***	0,147***	NS
	(0,020)	(0,021)	
LPIBR	NA	NA	NS
LFUN	0,197**	0,328***	NS
	(0,088)	(0,088)	
LTXAB	0,159**	NS	NS
	(0,067)		
LDIR	0,195***	0,194***	0,356***
	(0,052)	(0,053)	(0,117)
LLOC	-0,180***	-0,166***	NS
	(0,029)	(0,030)	
LTRACORP	0,208**	0,197***	0,707***
	(0,027)	(0,028)	(0,014)
R2	**0,994**	**0,993**	**0,990**
DW	**1,373**	**1,393**	**0,847**
ADF	**-5,815****	**-5,475****	**-3,732***

Notes: the same of Table 4.3

For building the intervals of values containing the efficient estimations, I followed the suggestion of Stock and Watson (1993). Under this suggestion, the researcher also has to recur to the Dynamic Ordinary Least Squares (DOLS) and to the Non-linear Least Squares (NLS) estimations. According to Stock and Watson (1993), this procedure produces a range of values (from the lowest to the highest values of the set of the estimation methods) that avoids some usual estimation errors, which can be the result, for example, of structural breaks not easily identifiable. Synthesizing the findings, Table 4.5 shows the range of values of the estimated elasticities omitting the cases where the intervals had a negative value as the lowest boundary and simultaneously a positive value as the highest boundary (which could be associated to non-significant true coefficients).

Table 4.5: Range of true values from combining the estimations of the SOLS, DOLS and NLS methods

	Regressands		
Regressors	**LDESPTR-LPIBR**	**LCORRR-LPIBR**	**LCAPR**
LDESEMP	[0,140; 0,295]	[0,147; 0,261]	NS
LPIBR	NA	NA	NS
LFUN	[0,119 ; 0,208]	[0,328 ; 0,416]	NS
LTXAB	[0,046 ; 0,159]	NS	NS
LDIR	NP	[0,010; 0,194]	[0,084; 0,263]
LLOC	NP	NP	NS
LTRACORP	[0,061; 0,208]	[0,099; 0,197]	[0,707; 0,736]

Note: "NS" signifies that the estimated coefficient was not significant in previous estimations. "NA" signifies that the hypothesis of the homogeneity of the regressor was considered in the estimation. "NP" signifies that the combining values did not reveal a range characterized only by negative or positive estimations.

Suggesting an economically intuitive interpretation of the results, we can point that an increase of 1% in the Number of Portuguese Unemployed can raise the size of the real total public expenditures in the real GDP between 0,14% and 0,30%.

The Number of Portuguese Unemployed is also the variable whose change is more likely followed by a raise in the size of Portuguese public expenditures.

Relating to LLOC and LDIR, the estimations of the three methods (SOLS, DOLS and NLS) generated intervals that have negative and positive values, which do not allow recognizing the confirmation of the hypotheses of centralization and the fiscal illusion as determinants of the Portuguese aggregate public expenditures, by an unequivocal way.

Observing the current and the capital expenditures, the variables that strongly influence these Portuguese outlays are the relation between direct and indirect taxes and the real Current Transfers *per capita.*

These results are according to some of the previously suggested theories, such like the redistribution processes (via capital transfers), the political-economic cycles (evaluated by the number of unemployed people), the fiscal illusion hypothesis (operated in particular components of the aggregate expenditures, like the capital ones, and not in the aggregate) and the bureaucratic theory (via the induced movement of an increasing number of public employees).

Some European studies that corroborate these findings are the works of Castronova (2002), Jeanneney and Hua (2004) and Crepaz and Moser (2004).

Cunha and Braz (2003) and Cardoso (2004) are examples of works subscribing these findings, particularly the relationship between the Number of Public Employees and the size of Portuguese Current Expenditures.

As a synthesizing message, these results offer an evidence for the relevance of public employees as a source of long-term growth of public expenditures. Additionally, it is proved that Portuguese real public expenditures are strictly dependent on the economic cycle, being often used as an instrument of macroeconomic stabilization in order to minimize the harmful of the unemployment. Finally, other motivations that explain the long-term path of the studied aggregate – the public outlays – are the redistribution process (through the manipulation of current transfers) and the *fiscal illusion*, two fields that deserve a deep focus in further researches.

According to Engle and Granger (1987), in order to evaluate the dynamics of the Cointegration Model, given the rejection of the hypothesis of non-cointegration among the variables, it is useful to recur to an Error Correction Model (ECM). The estimation of an ECM returns the proportion of the correction of the short-term deviations (λ) related to a long-term value of equilibrium.

Taking the equation 3.4, its ECM can be suggested by the equation 3.5 :

$$\Delta(LEXP_t) = \alpha + \sum_{j=1}^{k} \delta_j * \Delta(z_{j_t}) + \lambda * u_{t-1} + z_t \qquad (3.5)$$

Following Hendry (1995), the researcher has to include a previous large number of lags of the regressors (z_j) in equation 3.5 and, gradually, he has to eliminate the least significant, observing criteria like the Schwarz Information one.

The Table 4.6 shows the results reached for each regressand of the previous estimations.

Table 4.6: ECM estimations

Regressors	Regressands		
	Δ	**Δ**	**Δ**
	(LDESPTR-LPIBR)	**(LCORRR-LPIBR)**	**(LCAPR)**
Δ (LDESEMP)	0,158(0)*** (0,025)	0,149(0)*** (0,027)	NS
Δ (LPIBR)	NA	NA	NS
Δ (LFUN)	0,059(0) (0,174)	0,278(0)* (0,144)	NS
Δ (LTXAB)	0,192(0)*** (0,067)	NS	NS
Δ (LDIR)	0,098(0)* (0,050)	0,084(0)* (0,048)	0,398(0)*** (0,124)
Δ (LLOC)	-0,059(0) (0,056)	-0,100(0)** (0,046)	NS
Δ (LTRACORP)	0,362(0) (0,071)	0,216(0)** (0,048)	0,674(0)** (0,110)
u_{t-1}	**-0,527*** (0,136)**	**-0,695*** (0,136)**	**-0,433*** (0,116)**
R2	**0,709**	**0,717**	**0,386**
χ2(Norm)	**0,369**	**1,136**	**2,689**
F(AR)	**1,272**	**0,559**	**0,713**
F(ARCH)	**0,440**	**0,448**	**1,069**
F(HET)	**1,153**	**0,605**	**0,710**

Notes: Significance levels: 10% (*), 5% (**) and 1% (***) – *In the cells concerning the estimation of the coefficients, the null hypothesis is identified with the non-significance of the results while the null hypotheses related to the values in the last four lines (normality of the residual series, Breusch-Godfrey test with 4 lags, ARCH with 4 lags and Test for the Heteroskedasticity) are identified with the normality of the residual series, the absence of autocorrelation, the non-identification of the residual series with an auto-regressive conditional heteroskedasticity model and the absence of residual heteroskedasticity. Between parentheses, below the estimated coefficients, the standard errors are exhibited. . Between parentheses, immediately following the estimated coefficients, the preferred lag of the first difference of the regressor is exhibited, according to Hendry (1995). "NS" signifies that the estimated coefficient was not significant in the previous estimations and "NA" signifies that the hypothesis of the homogeneity of the regressor was considered in the estimation.*

Commenting the results from Table 4.6, we observe that all the estimated λ are negative and significant. The annual correction of any disturbance oscillates between the 43,3% (LCAPR) and the 69,5% (LCORRR)[16], reaching the conclusion that in almost two years any disturbance is assimilated in the long-term model.

Another interesting result is derived upon the lack of significance of the coefficients associated to the (growth[17] of the) number of public employees, LFUN, or to the variables LLOC and LTRACORP in the ECM of the proportion of the aggregate public expenditures in the Gross National Product (column 1 of the results). This result, following Gemell, Morrissey and Pinar (1998), recognizes that the variables related to the (growth of the) unemployment, the globalization of the economy or to the fiscal illusion hypothesis are more interesting to explain the found annual growth rates of the proportion of LDESPTR to the real GNP.

The non-rejection of the null hypotheses of the four specification tests (normality of the residual series, Breusch-Godfrey test with 4 lags, ARCH with 4 lags and Test for the Heteroskedasticity) show that there are not relevant specification problems in the estimated ECM.

5. Conclusion

The goal of this work was to identify determinants that can be recognized as responsible for the growth of Portuguese public expenditures. Although there is a substantial branch of Portuguese works that

[16] As expected, the estimated correction for LDESPTR-LPIBR (52,7%) reflects the weighted values of the estimated corrections for the components of the aggregate public expenditures (current and capital spendings).

[17] The first difference of the log values of a series is rather close to the growth rate between the original values of those observations, using a Taylor series approximation.

discuss this thematic using normative perspectives, this work offers an original contribution in order to empirically point the relevant determinants.

In detriment of the alternative classifications from Holsey and Borcherding (1997) or Mastromatteo (2003), the theories that can explain the studied phenomenon were considered according to the most observed typology, as stated by authors like Albi, González-Páramo and Zubiri (2000), Legrenzi (2001) or Kheng (2001). These authors assembly the theories on the growth of public expenditures into two categories: theories that mainly distinguish the pressure on Demand side (with the assumption of the neutrality of public agents) and theories that refute the neutrality of decision-makers defending the relevance of the Supply side action.

Using aggregate data (and their components) since 1947, it was found that the variables that significantly explain the revealed movement in the real total public expenditures are the Number of Unemployed, the Number of Public Employees, the Rate of Openness and the real Current Transfers *per capita*.

Observing the current and the capital expenditures, the variables that robustly influence these Portuguese outlays are the relation between direct and indirect taxes and the real Current Transfers *per capita*.

These results are according to various of the formerly suggested theories, such like the redistribution processes (via capital transfers), the political-economic cycles (evaluated by the number of unemployed people), the fiscal illusion hypothesis (operated in particular components of the aggregate expenditures, like the capital ones, and not in the aggregate) and the bureaucratic theory (via the induced movement of an increasing number of public employees).

Using ECM estimations, it was verified that the yearly correction of any commotion oscillates between the 43,3% (capital component) and the 69,5% (current outlays), getting the conclusion that any disturbance is assimilated in the long-term model in almost two years.

Finally, there is place to warn against a very common statement: these results identify some economic aggregates as determinants of the movement associated to the Portuguese Public Expenditures. But we can not, aprioristically, infer that they explain with the same statistical quality the movement of another (very important) aggregate: the Public Budget, which results from the non-correspondence between Public Expenditures and Public Revenues. For instances, if a 1%-change in the Number of Public Employees increases the value of real Public Expenditures in 0,21% (expected maximum), we can not expect the return of the same value in order to evaluate the impact in the Public Budget variable. As Public Employees generate product and as they contribute to the Public Revenues, this impact would be less than the one obtained in this work.

In spite of this advertisement, the present work can be observed as a detailed contribution to point the determinants that actually explain the growth of Portuguese Public Expenditures, since 1945, overpassing the idiosyncratic existent national debate over this relevant thematic.

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